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Associations Between Management Forecast Accuracy and Pricing of IPOs in Athens Stock Exchange

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This study examines the earnings forecast accuracy of newly listed companies on the Athens Stock Exchange and further investigates the relationship between earnings forecast and pricing of IPOs. It uses a unique data set of 208 IPOs, which were floated during the period of January 1994 to December 2001 in the Athens Stock Exchange. The results suggest that investors are able to anticipate forecast errors at the time of listing. Pricing of IPOs indicate that firms with negative earnings forecast (pessimistic) are associated with low level of underpricing while optimistic management earning forecast can be a signal for high initial returns. Three variables – age of the IPOs, ownership by insiders and industry classification significantly contribute towards accuracy of earnings forecast.

Keywords: earnings forecast, IPO, accuracy of earnings, forecast error

I. Introduction

An important feature in the going public procedure is the prospectus, a legal document that aims to reduce information asymmetries and inform the investors on the financial status of newly listed firms. Initial public offerings (IPOs) worldwide use prospectuses to publish financial

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forecasts (i.e. earnings, sales, expenses) based on their confidence in an accurate prediction, bearing in mind the voluntarily/mandatory status that depends on the country in which they want to go public.

The study of management forecast accuracy can be instructive with regards to several capital market issues. Waymire (1984), Lev and Penman (1990), King et al (1990), Firth (1998) and Cheng and Firth (2000) demonstrate that an earnings forecast can be an extremely important signal of company valuation, and public disclosure of forecasts can reduce information asymmetry between managers and investors and hence lower agency costs. However, in order for the earnings forecast to be useful, it needs to be accurate.

The motivation for this study stems from the fact that there is a paucity of research in earnings forecast accuracy at the European level (except the evidences for UK) and internationally in markets outside of the commonwealth countries. Only few years back there were two studies at the international level for markets outside of British Commonwealth status, by Lonkani and Firth (2005) for Thailand and Jaggi et al (2006) for Taiwan. Our aim is that the emerging findings of the present study will assist investors with their future assessment of earnings forecasts, which will in turn further enhance their understanding of equity valuation.

Additionally there are only few studies examining the association between management forecast accuracy and pricing of IPOs. This paper sheds light on the IPO pricing phenomenon and its connection to forecast error by providing ground to the initial returns reported in each *FE* category. It appears that IPOs with pessimistic forecasts are rewarded with low level of underpricing in the immediate aftermarket and they 'leave small amount of money on the table'. Furthermore, there are evidences that Greek market has mechanisms to recognize IPOs with optimistic forecasts.

The primary objective is to examine the management's forecast accuracy in Greece for firms seeking a listing on the Athens Stock Exchange. The research is important as earnings forecasts are the major valuation factor for IPOs in Greece and so this is an important study for both institutions and private investors (helping them to make future investment decisions on new issues). The mandatory status in Greece for new firms to furnish management earnings forecasts in their prospectuses provides a rare test case for an ongoing debate on the usefulness of the forecasts in the market valuation of IPOs.

Mandatory forecast of earnings would allow the investors to search how accurately a firm can provide this figure. Comparing to countries

with voluntary supplied forecasts the big advantage of mandatory disclosure is that it helps investors to explore the low quality IPOs and segregate them from promising firms. Those IPOs are naked with this method as they have neither the ability nor incentives to make good prediction so they provide a forecast with big error. On the other hand their bad quality can be hidden behind the choice option that voluntarily method creates. Additionally mandatory status helps some good firms which would be skeptical to reveal their forecast earnings under the voluntary method to signal their quality by providing an accurate figure.

The next section of the paper reviews some of the literature on the accuracy of IPO earnings forecasts. The institutional characteristics of the new-issue process in Greece are described in section III. Determinants of earnings forecasts are analysed in section IV and this is followed by a methodology and data description in section V. Section VI provides a presentation and discussion of the results. Finally, a summary and conclusion are made.

II. Previous Research

Disclosure of management earnings forecasts is optional in many markets. When it comes to the voluntary disclosure of profits there is great interest by researchers (Trueman, (1986); Darrough and Stoughton, (1990); Darrough, (1993); Frankel et al, (1995)) on studying the accuracy of this information. Many studies have been conducted for countries with less litigious environments including mainly British Commonwealth States (Australia, Canada, Hong Kong, Malaysia, New Zealand, Singapore and South Africa). On the other hand, there has been only one study on forecasts in the U.S. market, put forward by Kasznik (1999). The disclosure of earnings forecasts for IPOs in the U.S. has been almost non-existent due to its highly competitive environment.

Keasey and McGuiness (1991) examine the accuracy of voluntary earnings forecasts in IPO prospectuses in the UK market. They address that the disclosure of this information depends upon a firm's competitive situation relative to other players. Their findings reveal a positive bias, and they report that management typically underestimates future earnings. Clarkson et al (1989) for Canada, Firth et al (1995) for Singapore, Jelic et al (1998) for Malaysia, Mbuthia and Ward (2003) for South Africa and Jaggi et al (2006) for Taiwan all predict positive forecast errors. On the other hand, Firth and Smith (1992) for New

TABLE 1. Summary of previous studies on the accuracy of forecast earnings

Country	Study	Period	Sample	Forecast Error (%)	Absolute Forecast error (%)	*FE* Range (%)
Australia	Blair and Taylor (1989)	1977-1986				
	Lee (1993)	1987-1989		994	1138	
	Brown et al. (2000)	1980-1996	431	–7.95		
	Hartnett & Romcke (2000)	1991-1996	134	–30.35	88.29	
Canada	Pedwell et al. (1994)	1983-1987	112	–77.7	88	+101.3 to –3958.5
	Clarkson (1992)	1984-1987	93	99	NA	+3958.to NA
	Clarkson (2000)	1992-1996		23.1	NA	
China	Chen and Firth (1999)	1989-1996	125		13.25	
Hong Kong	Chan et al. (1996)	1990-1992	110	12	18	
	Jaggi (1997)	1990-1994	160	6.5	12.79	
	Chen et al. (2001)	1993-1996	162	9.94	21.96	
Malaysia	Jelic et al (1998)	1984-1995	122	33.37	54.1	4110.53 to –136.17
New Zealand (m)	Mak (1989)	1983-1987	71	NA	100	
	Firth & Smith (1992)	1983-1986	89	–92	328	3047 to –12393
	Firth (1997)	1979-1987	143	–91	111	
Singapore	Tan et al (1987)	1972-1984	51	24	NA	
	Firth (1998)	1977-1992	116	20.11	10.4	
South Africa	Mbuthia and Ward (2003)	1980-1998	506	14.3		
Taiwan	Jaggi et al (2006)	1994-2001	759	20		

(*Continued*)

TABLE 1. (Continued)

Country	Study	Period	Sample	Forecast Error (%)	Absolute Forecast error (%)	*FE* Range (%)
Thailand	Lonkani and Firth (2005)	1991-1996	175	–6.86	35.76	
U.K	Dev and Web (1972)	1968-1969	212	112	NA	46.6 to 196.4
	Keasey & McGuinness (1991)	1984-1986	121	5	11	

Note: Results reported are based on the following error metrics: $FE = [(AP_{it} - FP_{it}) / |FP_{it}|]*100$ and $AFE = |(AP_{it} - FP_{it})| / |FP_{it}|]*100$. In Dev and Webb (1972) , the forecast error based on the ratio between the reported and forecast profits before corporation tax. Forecast error in Clarkson et al. (1992) as $FE = (FP_{it} - AP_{it}) / |FP_{it}|$. Forecast error in Tan (1987) is calculated as $FE = (FP_{it} - AP_{it}) / |AP_{it}|$.

Zealand, Hartnett and Romcke (2000) for Australia and Lonkani and Firth (2005) for Thailand report negative average forecast errors.

Evidence on the accuracy of management earnings forecast reveals absolute forecast errors from as low as 10.4% by Firth (1998) for Singapore and 11% for UK by Keasey & McGuinness (1991) to an enormous 1138% reported by Lee (1993) for Australia. The last high result attracted more researchers to study the Australasian case. In a more recent study Hartnett & Romcke (2000) report a high 88.29%, which indicates that the regulatory environment should become more strict in the case of Australian IPOs.

A similar outcome is indicated by studies carried out in New Zealand with *AFE*, which vary from 100% in the study by Mak (1989) up to 328% by (Firth & Smith, (1992). The level of errors is high compared to UK: Keasey & McGuinness (1991) at 11%, and Hong Kong by Jaggi (1997) at 12.79%. Table 1 summarizes the results of previous studies on forecasting and the accuracy of earnings forecasts in IPOs prospectuses.

III. Institutional framework of ASE

The ASE began its operations in 1879 and is the oldest stock exchange in the Balkan area and one of the oldest stock markets on the European continent. It took more than a century for the exchange to taste considerable growth. During the last decade of the twentieth century, many regulatory changes brought a revolution in the number of firms traded on the ASE. The number of companies climbed from 150 at the end of 1993 to more than 330 at the end of 2001. The Main market is the major component of the ASE associated with Parallel and New Markets. Most of the firms are traded in the Main market while during the period of our study there were more entrances into the Secondary (parallel) market of the ASE. The total market capitalisation of the firms traded has increased from €9.8 billion at the end of 1994 to €200 billion at the end of 1999. Another noticeable area of growth is observed in the net profits of the IPOs, which increased from €560 million in 1993 to €1.7 billion by the end of 2001.

The Athens Stock Exchange, in principal, requires new issues to make mandatory disclosure of profit forecasts in their prospectuses. Thus, Greece is one of the few countries that, in order to reduce information asymmetry, the managers of firms making IPOs are required to disclose a profit forecast for the forthcoming year. Similar

places experiencing this shift are the markets in Malaysia, New Zealand, Singapore and Thailand. In contrast, IPOs in Australia, Canada, Hong Kong, South Africa, Taiwan and U.S. are not required to disclose a profit forecast in their prospectuses. In addition, the London Stock Exchange requires companies to include a statement of financial and trading prospects in their prospectuses while profit forecasts are not mandatory.

IV. Methodology & Sample Description

A. Models on earnings forecast

The accuracy of earnings forecasts that are disclosed in the Greek IPO prospectus is examined by using common forecast error measures, which have been referred to in the literature by (Chan et al., (1996); and Jelic et al., (1998)). Comparing actual earnings figures for 'accounting year t' with earnings forecasts gives an indication of their accuracy. The most widely used forecast errors metrics are forecast error, absolute forecast error, and square forecast error. The forecast error measures are estimated, as shown below.

The forecast error for company (i) for the year of the IPO (t) is calculated as follows:

$$FE_{it} = \left(AP_{it} - FP_{it} \right) / \left| FP_{it} \right|, \tag{1}$$

Where FE_{it}, is the forecast error for company i, AP_{it}, stands for actual profit for company i; and FP_{it}, is the forecast profit as given in the IPO prospectus.

The mean forecast error is a measure of bias in forecasting. It examines whether company management systematically over or underestimates earnings for firms in Greece. By examining the sign of the forecast error (positive and negative), we can conclude whether a company is optimistic or pessimistic about its future profits since we test whether the profits are overestimated or underestimated. A positive value for the mean forecast error (MFE) implies that, on average, IPO companies have a pessimistic bias (firms under-forecast) while a negative value for MFE represents an optimistic bias (firms over-forecast).

The Absolute Forecast Error (AFE) is taken using the absolute value

of the forecast errors (*FE*s) for each Greek IPO. In this study, the 'absolute forecast error' measures the relative deviation of actual earnings from forecast earnings and provides an indication of how close the forecasts were to actual profits in absolute terms. The earnings are before tax and before extraordinary items. Brown et al. (2000) report that the absolute forecast error measures forecast accuracy and the signed forecast error measures the bias. The *AFE* is measured by:

$$AFE_{it} = |(AP_{it} - FP_{it})|/|FP_{it}|, \tag{2}$$

Where *AFE*=Absolute Forecast Error

Square Forecast Error (*SQFE*) is measured using the square of the forecast error. The squared forecast error gives more weight to large errors and, as Bhaskar and Morris (1984) specify, it is more appropriate for an analysis of investors' losses due to forecast inaccuracy. Firth and Smith (1992) specify that squared forecast error better models the loss to investors due to an erroneous forecast.

$$SQFE_{it} = ((AP_{it} - FP_{it})/|FP_{it}|)^2, \tag{3}$$

Brown et al. (1987) introduced a statistic that measures the superiority of forecasting profits (*SUP*) relative to the actual changes in profits. Management forecast superiority measures the ability of management to anticipate earnings more accurately than time series models. This measure is adapted for the Greek IPO market. One reason for the use of this metric is the difficulty in predicting the earnings of a specific Greek company. Positive value for *SUP* means that the Greek IPO profit forecast is more accurate than a forecast based on the random walk model. Otherwise, a negative value implies that the IPO forecast is inaccurate.

The measure of superiority is applied here for the IPO market:

$$SUP = \ln[(AP_t - AP_{t-1})/(AP_{it} - FP_t)]^2, \tag{4}$$

Where *SUP* is the superiority in forecasting profits relative to the actual change in profits, AP_t, stands for actual profit in year t, AP_{t-1} is the actual profit in year $t-1$ and FP_t symbolises the forecast profit in year t;

The denominator measures the error in the IPO forecast while the

numerator is the change in profit from year t–1 to year t. The numerator can also be regarded as the forecast error from a simple time series forecasting process, where AP_{t-1} is a random walk model estimate of the profit in year t.

B. Models on Underpricing

For each IPO considered, they were calculated two measures of underpricing: (i) the 'raw' underpricing, defined as the difference in percentage between the price of the share in the end of first day of trading and the offer (listing) price, (ii) the underpricing is 'adjusted' for market changes, taking into account changes of the Athens Stock Exchange Composite Index (ASECI) between the closing date and the first day of trading measured between the start of the public offering and the end of the first day of listing.[1] The difference between the two metrics was more visible in the 1990s, when listings used to take place much later than the offering. During large time lag periods, many changes in market conditions could occur. As a fact the initial return measured may be a result of changes in market conditions. So this is the reason raw initial return is adjusted for market changes and variances.[2]

Raw Initial Returns

$$RIR_{i,t} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}}, \tag{5}$$

Market Excess Returns[3]

$$MER_t = \left[\frac{P_{i,1} - P_{i,0}}{P_{i,0}} - \frac{MI_{i,1} - MI_{i,0}}{MI_{i,0}} \right], \tag{6}$$

[4]

1. In this analysis the market index was assumed to be the historical ASEGI index

2. These calculations are appropriate because the equilibrium prices of stock exchange reflect not only the companies' special characteristics but also, during the formation process, by the ascending and descending of capital market.

3. $RIR_{i,t}$= Raw initial return of company 'i' at period t, $MER_{i,t}$=Market excess return of company 'i' at period t, $P_{i,0}$=IPO offer price as per prospectus of company 'i', $P_{i,1}$=Closing price of IPO of company 'i' at the end of the first trading day, $MI_{i,0}$=ASE Composite Index at the date of prospectus company 'i', $MI_{i,1}$=ASE Composite Index at the close of first trading day of company 'i'

4. MER=Market excess return, $MI_{i,1}$ and $MI_{i,0}$ ASE Composite index on day 1 and offer prices setting date.

C. Sample Description

The study examines 208 IPOs listed on the Athens Stock Exchange's Main and parallel boards over the period from 1994 to 2001. The majority of data is hand collected and extracted from IPO prospectuses, the daily press and ASE reports. The prospectuses were referenced from the library, the ASE website and the Capital Market Commission resource centre. Data for the offer price, total gross proceeds, age of IPO companies, percentage of shares retained by owners, underwriters, and the closing date of the offer are extracted from the prospectuses.

To be included in the final sample, IPO prospectuses were required to contain precise earnings forecast figures. Those prospectuses that provided a forecasted range of expected earnings, or other non-specific forms of performance forecast, were excluded from the analysis, thus leaving 208 firms in the sample.

V. Determinants of Earnings Forecasts

In order to gain some insight into the reasons for good forecasting performance, a number of hypotheses were constructed and tested with respect to potential determinants. Based on past research and on a priori reasoning, we have identified fourteen potential determinants of profit forecast accuracy. Eight factors were chosen for this study and these are investigated as potential determinants of absolute forecast error. Those independent variables are company size, forecast horizon, age, financial leverage, underwriter reputation, proportion of shares retained by inside owners, industry classification and general economic conditions. Note that some of the variables considered by other researchers were not investigated, either because they have been only sporadically associated with absolute forecast error or because there was not such a case in the Greek market. Table 2 shows the key and most recent studies, and their observed significance.

To find out the possible determinants of *AFE* and to explore their relative relationships, the following hypotheses are constructed:

Firm Size (*SIZE*): The evidence in the literature suggests that it is easier to forecast the profits of larger companies than their smaller counterparts. Cox (1985), Firth and Smith (1992), Brown et al. (2000), Chen et al. (2001) and Dutta and Gingler (2002) report that large firms have more control over their market setting, enjoy comparative

TABLE 2. Potential determinants of prospectus forecast errors investigated in prior studies

Study	Keasey & McGuinness (1991) UK	Firth & Smith (1992) N. Zealand	Lee et al (1993) Australia	Pedwell et al (1994) Canada	Chan et al (1996) Hong Kong	Jelic et al (1998) Malaysia	Hartnett & Romcke (2000) Australia	Chen et al (2001) Hong Kong	Jog & McConomy (2003) Canada	Lonkani & Firth (2005) Thailand
Age	√	√	√	√*		√*		√	√*	√
Size	√	√*	√	√	√	√*	√	√*	√	√*
Forecast Interval	√*	√	√*	√*	√			√		√*
Industry	√				√	√*	√*	√		
Macro. Conditions	√			√*	√		√			
Float Year					√					
Leverage		√			√	√		√		√
Audit Quality	√			√*	√	√	√*	√	√*	
Underwriter	√*			√				√	√	
Growth Prospects			√							
Profit volatility	√			√	√*			√*		√
Equity retained	√	√				√	√	√*	√	
Type of Issue								√		
Range of activities							√			

Note: √ Variable analysed in study. *Significant association with forecast error.

economies of scale, and tend to be more diversified than smaller firms. This makes the earnings of larger firms less volatile, more predictable, and more accurate.

On the other hand, smaller companies tend to have less stable earnings, hence there is less opportunity for management making a more accurate earnings forecast in the first place (Jelic et al, (1998). In the case of small firms, managers have more difficulty in monitoring the use of the funds, and have greater difficulty in predicting the firm's future earnings that flow from their deployment.

However, larger firms are usually more diversified with a higher level of control in their market settings. This gives them more control over the level of profits because they have better information gathering and forecasting mechanisms. Their forecasts are likely to be more accurate than those of the smaller firms.

C_1 Larger firms enjoy lower forecasting errors through their ability to use more sophisticated forecasting techniques

Period of forecast – Horizon (*HOR*): There is some support in the literature for a positive relationship between *FE* and forecasting horizon as the forecasting process involves uncertainty and risk (i.e. accuracy tends to deteriorate with longer horizons). More specifically, there is the view that the longer the forecast horizon, the more likely the occurrence of unexpected changes. A brief explanation of the phenomenon is based on the amount of information a firm can cluster during the fiscal year. The information helps ensure a more secure prediction as it approaches the time for the announcement of the actual results.

Chen et al. (2001) argue that forecasting errors can be expected to increase as forecast intervals lengthen. They also reveal a significant positive relationship between forecast horizon and forecast error. Lee et al. (1993) document that the longer the forecast period, the greater is the opportunity for management to exercise discretion in maintenance and capital expenditure decisions, thus enabling actual and predicted results to be more closely aligned. Brown et al (1987) and Kasznik (1999) show that the shorter the time interval in months between the prospectus date and the year end to which the forecast pertains, the more accurate the forecast becomes. Based on the above evidence, we formulate the following hypothesis:

C_2 *AFE* is lower for IPOs that publish their forecast in short horizon

periods from the fiscal year end. The longer the interval, the greater the error.

Following Lee et al (2006) we measure forecast horizon as the number of months between the prospectus date and the end of the forecast period.

Age of Firm (*AGE*): Previous studies postulate that the longer a firm has been in existence, the greater the forecasting accuracy, predominantly because the predictions for earnings for completely new firms are extremely difficult compared to a firm with a solid earnings history.

Jelic et al. (1998) and Jog and McConomy (2003) specify that the profits of companies with no prior operating history are likely to be more difficult to forecast, given the fact that historical data are a very important input to the process of forecasting. Mak (1994) points out that even if a new company is to rely on the operating history of other companies in the same or a related industry, the available information on the operating history of those companies is likely to be a less reliable predictor of future earnings than one's own operating history.

Chen et al. (2001) report that older companies may be viewed as being less risky as they have more experience to draw on when making forecasts of their profits. On the other hand, Jaggi (1997) reports that younger companies may not be able to fully understand and appreciate the environmental impact on their future performance, and the lack of historical bases may hinder their capability to make accurate forecasts. All those views lead to a third hypothesis:

C_3 Forecasting accuracy improves the longer the company has been in existence.

We calculate age as the number of years from the date of incorporation until prospectus day.

Financial Leverage (*LEV*): The net profits of companies with comparatively high levels of debt are traditionally regarded as being more difficult to forecast. To accommodate this factor as a determinant of forecast accuracy, we introduce the independent variable of leverage. Variability in profit and leverage are well accepted in the literature as measures of a company's risk, Hartnett and Romcke, (2000). Chen et al. (2001) employed leverage to describe the mix of loan finance and equity finance in a company. They report that profit forecasting is more

difficult for risky companies that are highly leveraged.

Eddy and Seifert (1992) in an earlier study document that the higher the financial leverage, the higher the risk faced by the firm. In this case, there is the expectation of higher error for firms with comparatively high levels of debt. Thus, a negative relationship between leverage and the level of accuracy is hypothesised:

C_4 Absolute forecast error is positively associated with high levels of financial leverage.

We measure leverage as the 'long term debt over the total assets' of the company at the year-end date of the year under forecast.

Underwriter Reputation (*UND*): A fifth hypothesis relates to the credibility of underwriters. Previous research has examined the importance of reputation signalling and reveals that prestigious underwriters are associated with more accurate information, higher fees for their services, and are involved in more flotation (through their experience) compared with the non-reputable underwriters.

Titman and Trueman (1986) and Keasey and McGuinness (1991) stress that the choice of a high quality underwriter can be viewed as a signalling mechanism where high quality underwriters will be selected by firms with more favourable information. They suggest that an owner with more favourable information will be willing to pay the fee of a more credible advisory body.

Firth and Smith (1992) and Brown et al. (2000) report that the forecast provided by firms going public with a prestigious underwriter is more accurate, as it is likely that the forecasts are based on information provided by underwriters. A high quality underwriter is argued to have lower agency costs and come at a lower risk for the firm.

More reputable underwriters are expected to face greater expected loss to reputation, in the case of a misrepresentation. Dunbar (2000) and Chen et al. (2001) suggest that large forecast errors will damage underwriter reputation and so there is clear incentive to closely monitor the profit forecasts. The commentators support that, principally, bankers and underwriters add credibility to companies when raising capital. To accommodate this factor as a determinant of forecast accuracy, the following hypothesis is constructed:

C_5 We hypothesise a negative relationship between the *AFE* and the reputation of the underwriter.

Underwriter reputation (UNW) is a dummy variable taking the value one (1) if the underwriter is a reputable bank, otherwise UNW is coded zero (0).

Retained Ownership (*OWN*): The proportion of retained ownership held by pre-issue owners may reflect forecast integrity. A lower proportion may signal owner concern about forecast accuracy while a high level of retained ownership indicates higher confidence and forecast achievability.

Ruland et al. (1990), Firth and Liau-Tan (1997) and Jelic et al. (1998) suggest that a higher percentage of management share-ownership may signal that the directors-owners are more confident about the future prospects of the company, and are likely to commit more resources and attach a greater importance to the earnings forecast as a signal of the quality of their company.

Jog and McConomy (1997) and Chen et al. (2001) report that insiders have other means to predict profits, while outsiders have to rely on the prospectus forecast. They argue that the larger the number of outside shareholders, the greater the problem if the forecasts are inaccurate. Otherwise, the possibility of a decline in share price is less likely to deter managers, who retain little or no interest in the firm, from providing optimistic forecasts since its limited post-IPO market share affects their wealth less.

The percentage of post-offer retained ownership to be held by pre-offer owners is used as a proxy. To accommodate this factor as a determinant of forecast accuracy, the following hypothesis is constructed.

C_6 Proportion of shares retained by inside owners is negatively related to absolute forecast error.

Industry Classification (*IND*): Industrial classification has an association with the level of forecast accuracy, mainly due to differences in various sectors' cost structures and revenue volatility. This is because each sector faces competition and complexity that may make it easier for firms in some industries to forecast more accurately. Prior studies have used industry groups when analysing forecast error. In most of the cases, the evidence suggests that industrial classified firms are related to forecast accuracy.

Mak (1989) and Jelic et al. (1998) found 'industry' to be a significant variable. They argue that earnings forecasts become even

more important when the Security Commission requires IPOs in specific sectors to provide guarantees for their profit forecast. IPO companies in those sectors proved to be less accurate in forecasting their profits than companies in other sectors. Hartnett and Romcke (2000) report that since management's forecasting ability relates to the predictability of industry activity, unexpected activity should incur a greater forecasting error.

For the purpose of the Greek case, we compare companies from the service sector, transportation, – non industrial firms – that have more unpredicted activities with companies from all other sectors – industrial firms – with more predicted activities. In order to test this hypothesis, (*IND*) is assigned a dummy variable of one (1) if the company is among the industrial firms (expected sector activities), otherwise *IND* is coded zero (0) if it belongs to service sectors, transportation, (unexpected sector activities).

C_7 A negative association is hypothesised between industrial firms and forecast error.

Economic Condition (*ECON*): A critical challenge for any economy is the optimal allocation of savings to investment opportunities. Gross domestic product (GDP) is the base we apply to measure economic conditions.[5]

Pedwell et al. (1994) and Hartnett and Romcke (2000) suggest that the ability to forecast accurately is influenced by the variability of the economic conditions in effect from the beginning to the end of the forecast period. They specify, somewhat obviously, that the more unstable economic conditions are, the more difficult it is to forecast accurately. Additionally, Chan et al. (1996) report that the larger the fluctuations in economic activity, the more the absolute forecast error that one would expect in forecasts. In that case, smaller change in GDP produces a lower level of errors in earnings forecasts. To examine this notion, the following hypothesis is formulated.

C_8 Absolute forecast error tends to be lower the smaller the changes in economic conditions (measured by GDP).

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5. Gross domestic product represents the total market value of all final goods and services produced in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports

Hypothesis one through eight are tested by the following multiple regression using the error metrics.

AFE and *SUP* vary across companies, so we estimate two cross-sectional models to help us explain the variations. We test the following model for *AFE*:

$$AFE = a + \beta_1^* \ln SIZE + \beta_2^* HOR + \beta_3^* AGE + \beta_4^* LEV + \beta_5^* UND + \beta_6^* OWN + \beta_7^* IND + \beta_8^* ECON + \varepsilon, \quad (7)$$

$$SUP = a + \beta_1^* \ln SIZE + \beta_2^* HOR + \beta_3^* AGE + \beta_4^* LEV + \beta_5^* UND + \beta_6^* OWN + \beta_7^* IND + \beta_8^* ECON + \varepsilon, \quad (8)$$

In the above equation, the absolute forecast error and superiority by management in forecasting profits relative to the actual change in profits for each company are used as dependent variables. The R^2 and F-statistics are used to test whether the above-mentioned variables could significantly explain absolute forecast error.

VI. Results

A. Descriptive Statistics

Distributional statistics of forecast errors, absolute forecast errors and forecasting superiority measures are shown in table 3. The mean forecast error for the sample is 8.04 percent while the positive sign for mean forecast earnings reveals that reported profits (actual) exceed their forecasted profits. This result contradicts international evidence that management of IPOs are typically over-optimistic in their earning forecast. In addition, it is consistent with Allen et al (1997), who report that profits are frequently adjusted upward if they are expected to fall below forecast, but rarely drift down if the forecast is exceeded.

Psychology helps us to provide an explanation on the higher reported profits in Athens Stock Exchange comparing with forecasted earnings.

TABLE 3. Summary statistics of IPO profit accuracy

A. Descriptive statistics of dependent variables

Variable	*FE* (%)	*AFE* (%)	*SQFE* (%)	*SUP*
Mean	8.04	42.82	3044	2.25
Median	2.12	36.55	1340	1.55
St. Dev	54.39	34.67	5937	2.35
Min	–105.30	0.38	0.14	–2.35
Max	234.82	234.82	55140	14.31
Skewness	0.80	1.97	5.59	1.94
Kyrtosis	1.47	6.77	39.21	5.29
Sample Size	208	208	208	208

B. Parametric and Non Parametric tests

	Test Method		
	Parametric Test (One sample T-test)	Non parametric Tests	
	T-test, p value	Kolmogov Smirnov, p-value	Wilcoxon test, p-value
FE	(2.137), [0.034]	(0.996), [0.275]	[0.016]
AFE	(17.834), [0.000]	(1.592), [0.013]	[0.000]
SQFE	(7.378), [0.000]	(4.375), [0.000]	[0.000]
SUP	(1.009), [0.314]	(1.604), [0.012]	[0.162]

Note: This table shows profit forecast accuracy using five metrics. The four measures are forecast error, absolute forecast error, square route forecast error and forecast superiority. *FE*, Forecast Error = $(AP_{it} - FP_{it}) / |FP_{it}|$; *AFE*, Absolute Forecast Error = $|(AP_{it} - FP_{it})| / |FP_{it}|$ and *SQFE*, Square Forecast Error = $(AP_{it} - FP_{it} / FP_{it})$; *SUP* = $\ln[((AP_{it} - AP_{it-1})/(APit\text{-}FPit))^2$. *FE* = profit forecast error; *AP* = actual profit; *FP* = profit forecast as given in the IPO prospectus; For *FE*, test of average (mean and median=0 vs. average not=0; For *AFE* and *SQFE*, test of average (mean and median)=0 vs. average>0; Test statistics (*) and p-values [*] indicate the level of significance different from zero using the Wilcoxon median test. *** Significant at the one per cent level **Significant at the five per cent level *Significant at the ten per cent level.

The Greek mentality allows the investors and all interesting parts to accept a pessimistic version of a forecast rather than a prediction which overestimates the profit. Further the mandatory disclosure of earnings forecasts creates incentives for managers to manipulate earnings during the year following the public offering. Indeed, firms who mandatory include earnings forecasts in their offering prospectuses are expected to differ from non forecasters of countries with voluntary status in their level of earnings management during the year following the public offering. The investigation of earnings management in the new issues market is based on the estimation of discretionary accruals (e.g.,

Dechow, (1995); Jones, (1991); Kothari, Leone, & Wasley, 2001).

The mean absolute forecast error is 42.82 percent. This finding is higher than prior evidence (Firth and Smith (1992); Lee et al. (1993); Pedwell et al. (1994); Jelic et al. (1998); Brown et al. (2000); Lonkani and Firth (2005); Jaggi et al (2006); Gounopoulos and Skinner (2010)). The mean forecast error and mean absolute forecast error for Greek IPOs are quite small compared to the results of Australia, Canada, China and New Zealand. Overall, the earnings forecasts in Greece can be characterised by a medium level of accuracy with a pessimistic bias.

Panel B of table 3 sets out the results of the analysis of the four different forecast errors discussed and reported below. The reported values suggest that mean *FE* is significantly different from zero at five percent. The mean of *AFE* is also significantly different from zero at the one percent level. Using non-parametric tests for the median, the *FE* is also significantly different from zero.

Table 4 provides descriptive statistics for the independent variables. The mean age of the companies examined is 17.8 years (median 15 years). The maximum value for age is 115 years and the minimum is a couple of months. The forecast horizon varies between one and twelve months. The mean forecast horizon for the sample is 127.33 trading days or 5.5 months. The size of the sample companies varies substantially. The biggest company measured by issue size during the forecast period, amounting to €8.05 billion, is Hellenic Telecommunication Organization while the company with the lowest size at €5.3 million is Informatics SA. On average, the owners of the sample firms retained just over three quarters of their shares after the IPO with a range from 13.70 to 95.23 percent The average leverage (Long term liabilities/ Total Assets) is 7.12 percent with a range of 0.1 percent to 43.39.

Panel A of table 5 summarizes the forecast errors, together with the Mean Forecast Error (MFE) for the IPOs during the specified year. A negative value of MFE implies that the earnings forecasts for the IPOs during that particular year are overstated relative to the actual earnings reported. The results show a balance in the number of IPOs with positive and negative forecast errors. The MFE does not present a specific trend among the years but it is worth noting that during year 2001, only two firms had a positive *FE* and the remaining 11 had a negative result.

Panel B of table 5 indicates the absolute forecast error during each specified year of the sample. There are 62 firms with a quite low *AFE* (less than 20%) while there are 55 firms with a high *AFE* (more than 60%). Individual results show that firms listed during 2000 experienced

TABLE 4. Description Statistics of continuous and discrete independent variables

Variable	*SIZE* (€ m)	*HOR* (days)	*AGE* (years)	*LEV* (%)	*UND*	*OWN* (%)	*IND*	*ECON* (%)
Mean	85.28	127.3	17.86	7.12		80.82		9.74
Median	20.27	130	15	2.81		80.37		9.9
Proportion=1					0.67		0.72	
St. Dev	27.6	75.41	17.75	9.61		9.30		2.81
Min	0.55	1	0	0.1		13.70		5.5
Max	2380	262	115	43.39		96.86		23.5
Skewness	6.09	0.01	2.75	2.05		–4.26		0.63
Kyrtosis	40.76	–1.039	9.60	3.48		30.27		0.94
Sample Size	208	208	208	208	208	208	208	208

Note: This table lists the descriptive statistics of the variables used in the cross sectional regressions; The independent variables are: Size, logarithm of number of shares issued times the offer price; Horizon = length of the forecast period. This is the number of days between the prospectus date and the next fiscal year end; Age = the number of years from the date of the company's incorporation to the IPO date; *LEV* = by total debt over the total assets of the company at the year–end date of the year under forecast; UNW = a dummy variable taking the value of one, if the underwriter is National Bank of Greece, Commercial Bank of Greece, Alpha Bank, EFG Eurobank, and Piraeus Bank, otherwise UNW is coded zero; Own = proportion of shares retained by insiders/owners; *IND* = dummy variable taking the value of one if the company is an industrial classified firm, otherwise *IND* is coded zero if IPO belongs to service sector, transportation, finance and banking; *ECON* = the change in economic condition, measured by taking the annual growth (measured as a percentage) in GDP for the year of flotation.

TABLE 5. Summary of FE and AFE by year of listing

A. Percentage Forecast Error

Listing Year	<–30%	–30% to 0%	0% to 30%	Over 30%	Total	MFE (%)
1994	13	11	7	14	45	0.36
1995	3	3	5	8	19	25.94
1996	4	4	4	5	17	19.11
1997	2	1	2	5	10	–6.21
1998	5	4	6	9	24	15.48
1999	6	7	6	12	31	20.25
2000	13	13	11	12	49	1.36
2001	6	5	1	1	13	–36.22
Total	52	48	42	66	208	8.04

B. Percentage Absolute Forecast Error

Listing Year	<20%	20% to 40%	40% to 60%	Over 60%	Total	MAFE (%)
1994	10	14	10	11	45	42.65
1995	5	6	3	5	19	38.45
1996	7	2	2	6	17	49.86
1997	2	3	2	3	10	40.17
1998	9	3	5	7	24	39.00
1999	8	6	8	9	31	51.13
2000	17	14	9	9	49	37.49
2001	4	3	1	5	13	47.49
Total	62	51	40	55	208	42.82

the lowest mean *AFE*. There have been 113 IPOs with an *AFE* below 40% and 95 newly listed firms with an *AFE* over 40%. On the other hand, during 1999, which was one of the hot periods for the ASE, the market experienced the highest MAFE.

When a firm makes a forecast, the main target is to be as accurate as possible. It is rare for a forecast to be 100% accurate so some cases show an optimistic view by the management and other cases lean pessimistic. Table 6 classifies IPOs by pessimistic/optimistic forecast earnings, containing 101 and 107 firms respectively. The mean of forecast error for pessimists is 49.90 percent (median 43.62%) while the mean for optimists' lies at –35.72 percent (median of –31.05%). Panel B of table 3.7 contains the values of the t-statistics and the p-values of the parametric pair-sampled and non-parametric Wilcoxon-test. The results reveal that there is a high difference between the two samples.

The ownership of Greek firms is far more concentrated than in the

TABLE 6. Forecast Error (FE) and Absolute Forecast Error (AFE) categorisation by pessimistic/optimistic forecast and High/Low retained ownership

A. Categorization of pessimistic/optimistic forecast

Trend of forecast	No of IPOs	*FE* Mean	*FE* Median	*AFE* Mean
Pessimistic	101	–35.72	–31.05	35.72
Optimistic	107	49.90	43.62	49.90
All	208	8.04	2.48	42.82

B. Statistics for difference in means and medians

t-statistics for difference in means	Wilcoxon test for difference in median
FE	*FE*
–8.524 [0.000]***	–8.725 [0.000]***

C. Categorization of High/Low Retained Ownership

Trend of forecast	No of IPOs	*FE* Mean	*FE* Median	*AFE* Mean
High Retained Own	101	–3.04	–2.32	41.10
Low Retained Own	107	14.22	13.21	43.35
All	208	8.04	2.48	42.82

Note: Test statistics and p-values [*] indicate the level of significance for the differences in mean (T-Tests) and median (Wilcoxon test); *** Significant at one percent level; **Significant at five percent level; *Significant at one percent level.

United States, and Greek firms may make more use of dual class IPOs, Smart and Zutter (2003). Panel C classifies IPOs by the level of retained ownership. The results indicate that when the retained ownership is high we meet pessimistic earning forecast of –3.04% while in the cases with low retained ownership by pre-IPO holders the earning forecast is optimistic at 14.22%. Thus when ownership remain concentrated, controlling owners have an incentive to provide outside shareholder and investors less information in order to more freely exercise private benefits of control. That could account for the pessimistic forecasts.

B. Underpricing and 'money left in the table'

Table 7, Panel A, summarizes the results obtained by calculating the 'raw' and 'adjusted' mean underpricing over time. The number of firms exhibiting a positive (negative) underpricing is also reported. For year 1999 results exclude data of some IT company, because of their huge underpricing, due to the high-tech and Internet euphoria. The mean 'simple' underpricing, relative to the whole sample of 208 firms, is

equal to 41.85%, (42.67% if one considers the 'adjusted' return). In 1999, IPOs were significantly underpriced: given that during that period the market momentum was favourable, this is consistent with the 'hot issue markets' theory Ibbotson and Jaffe (1975), Ritter (1984) and Brailsford et al. (2000).[6]

For the period 1993 to Dec 1996 , the average level of underpricing is low (because of the daily ±8% price cap which was introduced in the Greek Market in 1993 and was abolished in 1997). This price cap was not allowing any IPO overpass this limit during a day and if the firm was reaching that level then the trading was immediately interrupted and rescheduled for the next day, Thomadakis et al. (2011). Thus the price cap constraints being in force on the Greek stock market, exerted substantial limitation into the fair initial price formation of IPOs. Carefully study of both *IR* and *MER* shows that there is increase in all the following years revealing that price cap prevented IPOs from reaching the equilibrium price.

Analysis of the IPOs seems to reveal a strong reduction in the underpricing during 2000, with mean values of about 57%, being even lower in 2001. Therefore it is worth investigating the determinants of such a pattern (table 10).

Table 7, Panel B computes the amount of money 'left on the table'.[7] Habib and Ljungqvist (2001) underlined that underpricing is not the entrepreneur's primary concern, although it may represent an opportunity cost. Issuers are expected to minimize the reduction in underpricing-induced wealth losses, which increase with the underpricing but also with the number of shares sold in the IPO. Additionally, Loughran and Ritter (2002) noticed that entrepreneurs rarely get upset about money left on the table.[8] As Greek inflation has

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6. Brailsford et al. (2000) analyze the behavior of the U.S. IPO market. They formally document the existence of hot and cold periods. By using a variety of IPO activity measures that capture different aspects of IPO volume, proceeds and underpricing the authors identify a number of hot periods over activity measures. They further document a leading relationship between underpricing and IPO volume of up to six months, supporting the contention that the decision to issue is a function of current underpricing.

7. Money 'left on the table' is defined as the offer price to closing market price on the first day of trading, multiplied by the number of shares offered.

8. Introducing the 'prospect theory' of issuers' behaviour, Loughran and Ritter (2002) argue that IPOs where wealth losses are large are almost invariably those where the offer price and market price are higher than originally expected. Thus, controlling issuers generally simultaneously discover they are wealthier than they expected to be, and underpricing may be considered an indirect form of underwriter compensation.

TABLE 7. IPOs mean underpricing (first day return), by listing year & money left in the table by listing year

A. IPOs mean underpricing (first day return)

		Underpricing (%)			Adjusted Underpricing			
Year	IPOs	Mean	Positive	Negative	Mean	Positive	Negative	Days
1994	45	5.41%	40	5	6.62%	36	9	34.5
1995	19	4.72%	16	3	4.08%	11	8	43.3
1996	17	5.59%	15	2	5.65%	15	2	30.5
1997	10	19.91%	7	3	32.21%	8	2	33.1
1998	24	51.64%	20	4	51.59%	22	2	33.1
1999	31	102.78%	30	1	98.02%	30	1	31.7
2000	49	57.35%	38	11	56.79%	40	9	24.6
2001	13	34.61%	7	6	37.85%	9	4	23.7
Total	208	41.85%	173	35	42.67%	171	37	31.03

B. Money left in the table

Year	Sample Size	Total €m	Total (Inflation adj)	Mean €m	Mean (Inflation adj)
1994	45	47.079	49.121	1.120	1.169
1995	19	13.019	14.926	0.685	0.785
1996	17	411.609	511.259	19.600	24.345
1997	10	1655.898	2205.241	183.988	245.026
1998	24	3855.876	5274.359	124.383	170.140
1999	31	6284.080	8845.797	110.247	155.189
2000	49	3167.786	4420.890	64.648	90.222
2001	13	52.075	75.479	2.373	3.281
Total	208	1611.956	2148.742	52.722	73.051

(*Continued*)

TABLE 7. (Continued)

Note: The underpricing is adjusted by considering the market index return between the issue of the offer price and the listing. The number of days between the first day of the offering and the trading is reported. Sample: 208 IPOs on the Greek Stock Exchange between January 1994 and December 2001.

not been negligible during the 1990s and early 2000s, all statistics had to be adjusted to reflect inflation ratios provided by the Greek Statistical Authority.

The mean amount of 'money left on the table' is equal to €52.722 million (€73.051 million inflation adjusted). From 1995 to 1999, an increase in the mean amount of wealth losses is observed; in contrast, in 2000 the total and mean amounts of 'money left on the table' decreases and in 2001 are very low. In sum, one cannot report a clear trend in the mean amount, because of the influence of large privatization IPOs (Aussenegg (2000), Choi and Nam (2006)) (in which the number of offered shares is very large and potential wealth losses are larger).

One would expect underpricing to be lower in IPOs with voluntarily status of earnings forecast, coherent with the 'information gathering theory' of Benveniste and Spindt (1989). In fact, if earnings forecast are not mandatory in the prospectus, the intermediates may benefit from the feedback about the level of this information as they have more time to reduce uncertainty and may incorporate it in the final offer price. The last is in line with Dutta and Gigler (2002) theory that investors benefit from receiving voluntary management earnings forecasts despite of related incentives for earnings management. They analytically determine that the benefit of receiving earnings forecasts exceeds the cost that investors incur.

Table 8, Panel A show that, among the 208 IPO companies, only 30% have an absolute forecast error (*AFE*) below a value of 0.2 while 36.5% have an *AFE* above 0.5. Most companies have an *AFE* value of 0.1 through 0.2, while only eight companies among the Greek IPOs have an *AFE* greater than 1.00. Overall, it does not seem to be the case that many of the newly issued companies reported their actual profit earnings very close to their actual earnings. The study of forecast error shows that 42% of the Greek forecasts were clustered among ± 0.02% of actual earnings. This percentage is not satisfactory therefore, the management of future IPOs should make additional efforts for the improved forecasting of earnings.

Panel B examines the relation between the accuracy of management forecasts and the pricing of IPOs. The results indicate that the average level of underpricing in most of the *AFE* categories is near the mean level of returns (41.85% for raw returns and 42.67% for excess returns), although there are some notable differentiations in the categories with high *AFE*s.

Specifically, the riskiest IPOs (i.e., those with an *AFE* higher than

TABLE 8. Distribution of dependent variable Absolute Forecast Error and Forecast error

A. Distribution of dependent variable Absolute Forecast Error and Forecast error

Distribution of *AFE*	No of IPO	Cum Percentage	Distribution of *FE*	No of IPOs	Cum Percentage
0.0<*AFE*≤0.1	26	12.50	*FE*≤–0.8	7	3.40
0.1<*AFE*≤0.2	36	17.30	–0.8<*FE*≤0.6	12	5.80
0.2<*AFE*≤0.3	27	13.00	–0.6<*FE*≤–0.4	22	10.60
0.3<*AFE*≤0.4	24	11.55	–0.4<*FE*≤–0.2	29	14.00
0.4<*AFE*≤0.5	20	9.60	–0.2<*FE*≤0	32	15.45
0.5<*AFE*≤0.6	20	9.60	0<*FE*≤0.2	31	15
0.6<*AFE*≤0.7	18	8.65	0.2<*FE*≤0.4	25	11.60
0.7<*AFE*≤0.8	11	5.30	0.4<*FE*≤0.6	17	8.20
0.8<*AFE*≤0.9	10	4.80	0.6<*FE*≤0.8	15	7.25
0.9<*AFE*≤1.00	8	3.85	0.8<*FE*≤1.00	11	5.30
AFE≥100	8	3.85	*FE*≥1.00	7	3.40

B. *IR* and *MER* distributed by level of *AFE* and *FE*

Distribution of *AFE*	*IR*	*MER*	Dist. of *FE*	*IR*	*MER*
0.0<*AFE*≤0.1	41.21	40.30	*FE*≤–0.8	4.53	9.05
0.1<*AFE*≤0.2	50.72	50.75	–0.8<*FE*≤0.6	49.56	51.47
0.2<*AFE*≤0.3	60.63	63.12	–0.6<*FE*≤–0.4	21.97	25.03
0.3<*AFE*≤0.4	39.89	38.57	–0.4<*FE*≤–0.2	38.94	39.62
0.4<*AFE*≤0.5	21.79	24.90	–0.2<*FE*≤0	38.55	39.70
0.5<*AFE*≤0.6	41.25	43.05	0<*FE*≤0.2	49.67	49.53
0.6<*AFE*≤0.7	43.34	42.81	0.2<*FE*≤0.4	57.16	59.04
0.7<*AFE*≤0.8	43.24	42.60	0.4<*FE*≤0.6	37.90	39.22
0.8<*AFE*≤0.9	13.54	14.16	0.6<*FE*≤0.8	39.81	39.06
0.9<*AFE*≤1.00	32.32	30.41	0.8<*FE*≤1.00	30.40	27.29
AFE≥1.00	71.40	74.93	*FE*≥1.00	71.40	74.93

1.00) present an extremely high level of underpricing, which is mainly explained by Sherman and Titman's (2002) theory of information disclosure. They observe that the riskiest firms are the most underpriced, as the institutional investors do not feel confident and need more private information to reduce uncertainty about the firm's value. The level of underpricing for newly listed firms with *AFE*s between 0.8 and 1 is both surprising and inconsistent with the trend of IPOs with *AFE*s less than 1, as the returns to investors vary, on average, from 14.16% to 30.41%.

The findings on *FE*s shed more light on the phenomenon of IPO pricing and its relation to the forecast error. The issuers of IPOs with the most pessimistic forecasts seem to be rewarded for these predictions, as their firms are underpriced only by 9.05%. On the other hand, the Greek market shows unique maturity as it recognizes at an early stage the IPOs with optimistic forecasts and penalizes them with a high level of underpricing. Finally, the IPOs with perfect forecasts are not rewarded for this precise information, as their underpricing is exactly on the average of our total sample. We conclude that it is better to provide a pessimistic forecast of the earnings in the prospectus, as this is a signal for low underpricing in the aftermarket.

C. Cross sectional regression results for AFE

Multiple regression techniques can be used to take further investigation of forecast errors. A first issue of concern, before proceeding into the regressions, is the multi-collinearity test. The Pearson Correlation Matrix between the independent variables in table 9 shows that the highest correlation appears between *SIZE-ECON* with a negative coefficient of (0.453).

The results of the multiple regression models are shown in table 9. The regression is highly significant (p=0.008) but with an adjusted R^2 of only 9.6 percent. An individual study of the variables starts with size, which has not proved to be statistically related to forecast accuracy. The coefficient for size variable has the opposite sign to our prediction. Thus, the trend of our finding is consistent with the results reported by Firth and Smith ((1992)), Chan et al. ((1996)), and Baginski and Hassell ((1997)), who found that managers in larger firms tend to be less accurate than managers in smaller firms.

The coefficient for horizon is consistent (positive) with our expectations for absolute forecast error but it is not significant at any

TABLE 9. Pearson Correlation Matrix

Variables	1	2	3	4	5	6	7	8
1 *SIZE*	1.000							
2 *HOR*	–0.061	1.000						
3 *AGE*	0.149*	0086	1.000					
4 *LEV*	0.047	–0.013	0.102	1.000				
5 *UND*	–0.299**	–0.039	0.035	0.039	1.000			
6 *OWN*	0.155*	–0.027	0.127	0.216**	–0.052	1.000		
7 *IND*	–0.115	0.003	0.122	–0.128	–0.125	0.137	1.000	
8 *ECON*	–0.453**	0.061	–0.076	–0.102	–0.292**	–0.223**	0.135*	1.000

Note: This table lists the correlations among variables used in the cross sectional regressions. *** Significant at the one per cent level. **Significant at the five per cent level *Significant at the ten per cent level

level. This result is consistent with the results reported by Firth and Smith (1992). Jelic et al. (1998) link the lack of significance with the relatively short forecast horizon during which new funds are more difficult to estimate. The next variable to study is the age coefficient, which is highly statistically related to absolute forecast error. This finding is in line with all evidence, indicating that profits of companies with a shorter operating history are intrinsically more difficult to forecast and indeed older firms announce more accurate forecast profits. Our result for age is consistent with the results reported by Firth and Smith (1992), indicating greater forecast accuracy for firms with longer operating histories.

The coefficient for leverage (long-term debt over total assets) is positive – consistent with the hypothesised positive sign – and statistically insignificant. This result shows that the leverage control factor is in the correct direction but is not powerful enough to explain absolute forecast accuracy. The result confirms the findings of Eddy and Seifert (1992) and Chen et al. (2001), that the higher the financial leverage, the higher the risk faced by the company and the higher the absolute forecast error reported.

The underwriters' reputation variable has a positive sign, opposite from our hypothesis that the coefficient would be insignificant. In the Greek case, it appears that more non-reputable underwriters seem to be associated with better predictive accuracy. This result is inconsistent with the findings of Chen et al. (2001) and Jog and McConomy (2003), which had suggested more accurate forecast by management for firms that were underwritten by reputable underwriters.

The coefficient for industry is negative and statistically significant at the 5 percent level. This outcome is consistent with the results of Chan et al. ((1996)), Jelic et al. ((1998)), and Hartnett & Romcke ((2000) in suggesting that non-industrial firms (unexpected sector activities) are associated with a higher level of earnings forecast error. Finally, the 'Econ' variable has an unexpected negative sign, while the coefficient is not statistically significant. The results show that the economic condition in Greece has a negative impact on the *AFE*.

The explanatory power of the superiority regression model (*SUP*) in forecasting profits relative to the actual profits is lower than the *AFE* (R^2 = 8.1%). In summary, the results on the superiority in forecasting profits reveals a greater capability of the management of old firms to predict the earnings of the firm. The result for 'age' coefficient is consistent with the hypothesis and it is statistically significant. The

result is inconsistent with the results reported by Chen et al. (2001), in showing greater a superiority in forecasting profits on the part of firms with a short history.

The 'own' variable is also statistically significant. The positive sign is consistent with our hypothesis that low-retained ownership by entrepreneurs tends to increase management superiority in their ability to forecast profits. It might also account for the negative relation between retained ownership by entrepreneurs and management superiority in forecasting profits. A third variable, which significantly influences superiority, is industry classification. This outcome suggests that industrial-classified firms are associated with a lower level of management error. The other five factors (i.e. size, forecast horizon, leverage, underwriter reputation, and change of economic condition) that we tested do not indicate any statistical significance in explaining superiority.

The market excess returns results of the regressions, corrected for heteroskedasticity, are also presented in table 10. We find three factors that significantly affect the pricing of IPOs in Greece: the size of the firm, its leverage and the change in economic conditions.

Regarding the offering size of IPOs, we find a significantly negative relationship with the market excess returns, which is in line with Ritter (1984), Beatty (1989) and Levis (1993). As expected, a smaller offering size of a company means a lower marketability of the stock post-floatation; thus, the investors will face higher risk. Moreover, manipulation of price by institutional investors is a common practice in Greece. A smaller floatation size means that institutional investors can easier control a company's stock price, thus increasing speculation and uncertainty of the future price performance of the stocks. Therefore, as one of the proxies of risk and uncertainty, the offering size has a negative effect on the initial returns.

The second proxy employed to test the *MER* and significantly affects it, is the leverage of the IPO. The estimation result shows significance with a negative sign on the coefficient which opposes our expectation. When an issuer decides to go public with a highly indebted firm, investors expect the company not to have such great potential for future development and price performance while at the same time the risk of the company is high. In this case, to compensate for the extra risk investors take, IPOs with high-leverage features would be more underpriced.

We find that for listed firms, economic progress is associated with

TABLE 10. Cross sectional regression results of AFE, SUP

Specifications	*AFE*	*SUP*	*IR*	*MER*
Constant	128.74	–4.67	388.66	370.88
	(1.849)*	(–0.924)	(4.995)***	(4.714)***
SIZE	0.032	–0.026	–0.185	–0.183
	(0.568)	(–0.355)	(–2.491)**	(–2.401)**
HOR	0.018	0.069	–0.052	–0.084
	(0.255)	(1.165)	(–0.780)	(–1.231)
AGE	–0.172	–0.158	–0.070	–0.066
	(–2.333)**	(–2.069)**	(–1.122)	(–1.032)
LEV	0.043	0.009	–0.135	–0.138
	(0.829)	(0.126)	(–2.077)**	(–2.072)**
UND	0.046	–0.001	–0.064	–0.057
	(0.742)	(–0.018)	(–0.981)	(–0.862)
OWN	–0.092	0.148	–0.083	–0.090
	(–0.877)	(2.234)**	(–1.276)	(–1.354)
IND	–0.198	–0.184	–0.024	–0.027
	(–2.367)**	(–2.404)**	(–0.373)	(–0.410)
ECON	–0.026	0.090	–0.455	–0.392
	(–0.413)	(1.180)	(–6.742)***	(–5.661)***
R^2	0.096	0.081	0.214	0.172
R^2 Adjusted	0.060	0.043	0.185	0.141
F-value	(2.68)	(2.18)	(7.25)	(5.53)

Note: This table lists the variables used in the cross sectional regressions; The independent variables are: Size = logarithm of number of shares issued times the offer price (issue size); Horizon = length of the forecast period. This is the number of months between the prospectus date and the next fiscal year end; Age = the number of years from the date of the company's incorporation to the IPO date; *LEV* = by long term debt over the total assets of the company at the year–end date of the year under forecast; UNW = a dummy variable taking the value of one, if the underwriter is National Bank of Greece, Commercial Bank of Greece, Alpha Bank, EFG Eurobank and Piraeus Bank, otherwise UNW is coded zero; *OWN* = proportion of shares retained by insiders/pre IPO owners; *IND* = dummy variable taking the value of one if the company is industrial classified, otherwise *IND* is coded zero if IPO belongs to service sector - transportation, finance and banking, *ECON* = the change in economic condition, measured by taking the annual growth (measured as a percentage in GDP for the year of flotation; The t-statistics are robust for heteroskedasticity; t-values are in parenthesis; *** Significant at the one per cent level; **Significant at five per cent level; *Significant at ten per cent level

high market excess returns. This lends support to the proposition that since the government knows more than investors about - the state of the economy, the quality of all issuing companies and the level of risk involved in initial issues - to convince and attract investors to invest in the IPO market, makes the government to technically influence

underpricing of IPOs.

VII. Conclusion

Studies on the accuracy of earnings forecasts by management in the IPO prospectuses are limited mainly to commonwealth countries due to the lack of such forecasts in other markets. This could be due to the fact that making a specific quantitative forecast in some countries may entail risks that could be costly (US and Canada) and that forecasts are voluntary (Australia, Canada, Denmark, UK and Hong Kong). Greece is one of the few countries where the management of the IPOs is required to disclose profit forecasts in their prospectuses.

In this study the forecast accuracy is measured for 208 companies during the period 1994-2001. The results suggest that, on average, managers' understate earnings by 8.04 percent (median of 2.12%) while the mean absolute forecast error is 42.82 percent (median of 36.55%). The small difference between mean and median values indicates a small positive skew in the distribution of 0.80 for *FE* and 1.97 for *AFE*. Outliers had a major impact on *FE*. The elimination of these outliers decreases the *FE* to 3.91%. Descriptive statistics reveal that the forecast error is not normally distributed.

Cross-sectional regression equations are used to model absolute forecast error and forecast superiority. *AFE* in Greece is associated with the age of the firm, suggesting that IPOs with little operating history experience higher forecast error. Similarly, industrial categorised firms are associated with a higher level of forecast accuracy. Our results provide no support for size, forecast horizon, underwriter reputation and economic conditions.

This study also focused upon the superiority of management in forecasting profits relative to the actual change in profits. Positive value for *SUP* means that the Greek IPO profit forecast is more accurate than a forecast based on the random walk model. Overall, the results reveal that three factors – age of the firm, retained ownership and industry variables – have statistical significance with the superiority factor.

The study finds that reported profits exceed their forecast profits, and the result contradicts international evidence that management of IPOs is typically overoptimistic in earnings forecasts. The main reason is that Greek managers feel too weak and inexperienced to predict the earnings behaviour of their firms in the market, so, in this case, they

prefer to report conservative earnings forecasts that ultimately prove to be much less when compared with the actual profit, than an optimistic earning forecast that will not be verified by the actual results. Additionally, managers are scared of providing an optimistic view, as they fear their investor critics in the future, which could possibly detrimentally affect their firms.

The first-day return of our sample obtaining a mean (adjusted) underpricing equal to 41.85% (42.67%). It verified that underpricing is particularly high during 'hot issue' markets, and has been decreasing during the late 2000 and whole 2001. The findings run consistently to US evidence, where IPOs have been more heavily underpriced in 1998, 1999 and 2000 than in previous years. Yet, the comparison between the two markets reveals that both experienced the tech bubble of Technology Company. This suggests that similar to US in Greece the huge level of IPO underpricing in 1999 and 2000 was partly due to technology stocks. Moreover, it was verified that the pricing process is affected by several other determinants as the size of the firm, their leverage and the economic conditions of the market.

The findings of this study have serious implications to investors, shareholders and policy makers. First, investors should closely look the earnings prediction in the prospectus before they will reach their final decision as the way earnings forecast information is disclosed in IPO prospectuses is of great importance. Wrong decisions by both investors and shareholders – if they will keep position - may be costly especially in the long term. Second, as we document medium absolute forecast error in this study, it appears there is window for improvement by the policy makers' side. The mandatory status which forces any firm to provide earnings forecast in the prospectus no matter of their ability shows that disclosure of earnings forecast information without penalty can lead to unreliable forecasts. This result reinforces the role of voluntary financial disclosures as a means to reduce information asymmetry. This study could have implications for stock market regulators, as it suggests that mandatory disclosure of earnings forecasts may deteriorate the efficiency of the markets by increasing forecast error.

Emphasis should continue to be placed upon research into the variables of prospectus forecast accuracy. Even if the contributions today have been instructive, none have provided substantial explanations. However we proposed two interesting aspects for further consideration, which will help to improve collective knowledge on the

subject. Initially, we need to investigate whether managers take action to improve accuracy by managing reported profits. Second, as the regulation for mandatory disclosure of forecast earnings has changed in Greece in favor of voluntary disclosure, it will be interesting to provide the first comparative study on an international level for the same market.

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